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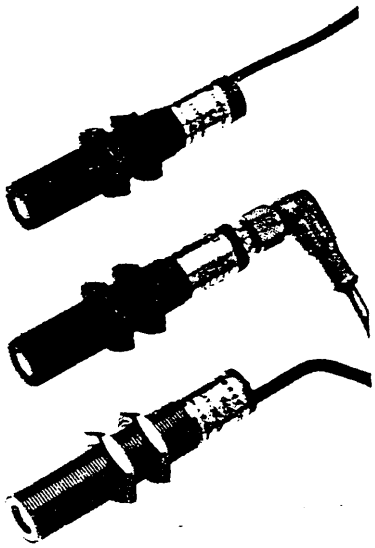
# Series 945
# with switching or analogue output



## Features

- Sensing distance 100 to 500 mm, 100 to 600 mm
- Repeatability ± 1 mm
- Temperature compensated elapsed time measurement
- Fixed internal setpoint at 200 or 400 mm
- External setpoint adjustment possible
- Switching frequency 16 or 60 Hz
- NPN and PNP output
- Distance information
- Inhibit and synchronising input

## Description

Series 945 ultrasonic distance sensors permit accurate position detection of practically all targets of any colour and material over a range 100 to 600 mm. The sensors are available with switching outputs which have sensing ranges of 100-200 or 130-500 mm, and with analogue outputs with ranges from 100 to 600 mm. The switching sensors come in two versions; stainless steel types with a built-in potentiometer which allows the setpoint to be varied; and plastic housed models with a fixed internal setpoint of 200 or 400 mm, which can be adjusted by an external potentiometer.

The analogue sensors have a stainless steel housing and sensitivity may be adjusted with a built-in potentiometer. If a target is within the acoustic cone and under the set switching distance, its presence is visually indicated by an LED at the end of the housing. The brightness of the LED is proportional to the intensity of the received ultrasonic echoes. Simultaneously, the short circuit protected NPN or PNP output closes. The synchronising or inhibit input can be used to prevent mutual interference in applications where several sensors are used simultaneously. The sensors are protected against reverse polarity of the input.

Temperature compensation, time-delayed measurement and sealing to IP 65 guarantee precise, noise free performance in harsh industrial environments.

## Typical applications

- Detection of targets in conveyance systems
- Presence detection in packing machines
- Wind and unwind control in the paper, film, foil and rubber industries
- Level control in filling plants
- Completeness checks

**Test conditions:** Target of sound reflecting material, 12x12 cm², vertical to beam axis and in still air at 20°C and 60% relative humidity.

## Technical data

| Specifications | Switching | Switching | Analogue |
|---|---|---|---|
| Order number | 945-N4 (Y/V)-2D-00 (1/2)<br>945-S4Y-2D-00 (1/2) | 945-F4 (Y/V)-2D-00 (1/2)<br>945-L4Y-2D-00 (1/2) | 945-L4Y-2D-1C0 |
| Sensing distance 1)<br>Switching frequency 2) | 100 to 200 mm<br>60 Hz | 130 to 500 mm<br>16 Hz | 100 to 600 mm<br>- |
| Response time 2)<br>Beam angle 3)<br>Linearity | -<br>6°<br>- | -<br>8°<br>- | 100 ms, 90% of end valves<br>8°<br><0.2% |
| Repeatability<br>Temperature compensation<br>Temperature range<br>Operating voltage<br>Current consumption | ± 0,3% of measured distance or ± 0.5 mm (bigger value)<br>0 to 50°C, measurement error ± 0,5%<br>Storage: -25 to +85°C, operating: 0 to 70°C<br>24 Vdc, ± 20%<br>< 10 mA without load | | |
| Setpoint<br><br><br>Setpoint adjustment | N: fixed setpoint 200 mm<br>Adjustment: ext. potentiometer<br>S: adjustment: int. potentiometer<br>100 to 200 mm | F: fixed setpoint 400 mm<br>Adjustment: ext. potentiometer<br>L: adjustment int. potentiometer<br>130 to 500 mm | -<br><br><br>- |
| Output<br>Switching hysteresis<br>Operating mode<br>Status LED | Open collector, PNP or NPN normally open, 100 mA/30 Vmax<br>Approx 5% of measured distance<br>Fixed<br>On, when within sensing distance | | 0 to 10 Vdc, sensitivity: 10 mV/mm<br>(Power supply $I_{max}$ = 10 mA)<br>Adjustment: int. potentiometer<br>On, when object detected |
| Adjustment aid<br>Inhibit<br>Synchronisation | LED intensity<br>Connection to 0V interrupts transmission<br>Connection to synchronisation input | | |
| Housing<br><br>Sealing | N/F M18 x 85 mm plastic, ca. 150 g<br>S/L M18 x 85 mm Stainless steel, ca. 160 g<br>IP 65 | | - |
| Termination | 5-core cable, 2 m long or plug connector | | 4-core cable, 2 m long |

1) Sensing distance is dependent on several factors such as target shape, surface, inclination to beam axis, reflective properties and environmental influences.

2) These values can only be achieved with an adequate target size. As a rule of thumb: d = 1000 v/f, where d = target width (mm), v = target speed (m/s), and f = given switching frequency (Hz) for a given range.

3) At close range, detection is also possible outside the given beam angle. The target to be detected should be as close as possible to the beam axis.

## Ordering details

**Sensing distance 100 to 200 mm switching frequency 60 Hz**
Fixed setpoint at 200 mm, plastic housing
2 m cable PNP : 945-N4Y-2D-001, NPN : 945-N4Y-2D-002
Plug connector PNP : 945-N4V-2D-001, NPN : 945-N4V-2D-002
Internally adjustable setpoint, stainless steel
2 m cable PNP : 945-S4Y-2D-001, NPN : 945-S4Y-2D-002

**Sensing distance 130 to 500 mm switching frequency 16 Hz**
Fixed setpoint at 400 mm, plastic housing
2 m cable PNP : 945-F4Y-2D-001, NPN : 945-F4Y-2D-002
Plug connector PNP : 945-F4V-2D-001, NPN : 945-F4V-2D-002
Internally adjustable setpoint, stainless steel
2 m cable PNP : 945-L4Y-2D-001, NPN : 945-L4Y-2D-002

**Sensing distance 100 to 600 mm**
Analogue output, stainless steel, 2 m cable, 945-L4Y-2D-1CO

## Sensing distance

The sensing distance of the sensors is shown in Figs. 21 and 22.

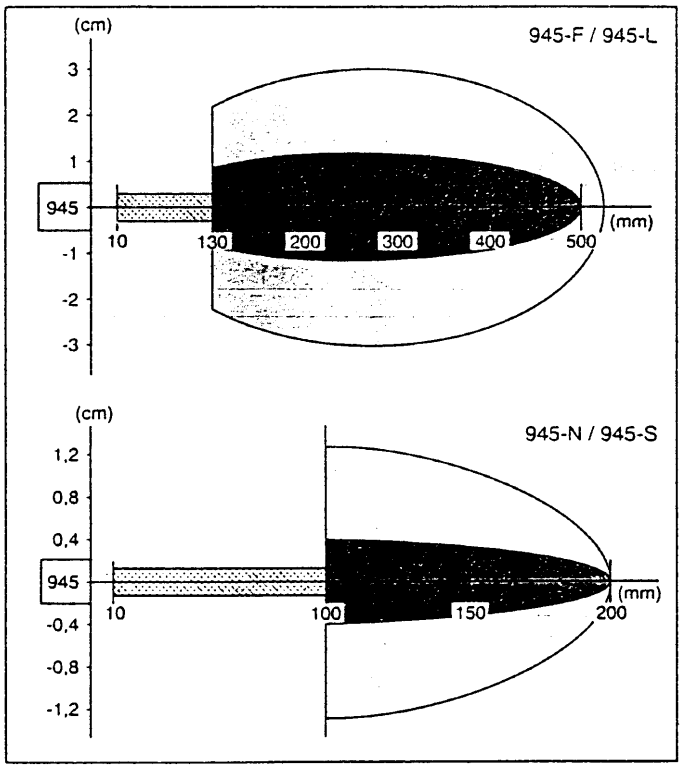



Figure 21. Sensing range of switching sensors

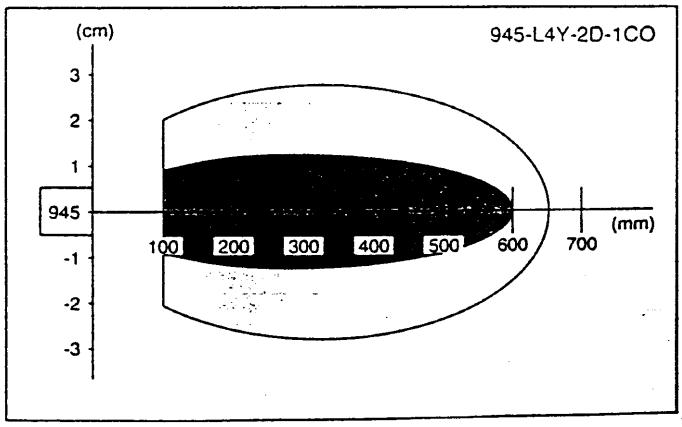
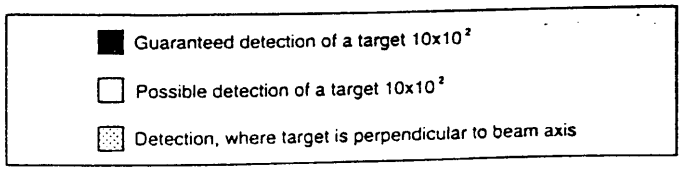



Figure 22. Sensing range of analogue sensors




## Connections

| Plug contact | Wire colour | Function |
|---|---|---|
| 1 | Brown | +24 Vdc |
| 4 | Black | Output normally open contact |
| 3 | Blue | 0V |
| 2 | Grey | Ext. setpoint adjuster |
| - | Pink | Open = enable<br>0V = inhibit<br>connection to 2nd sensor = synchronisation |

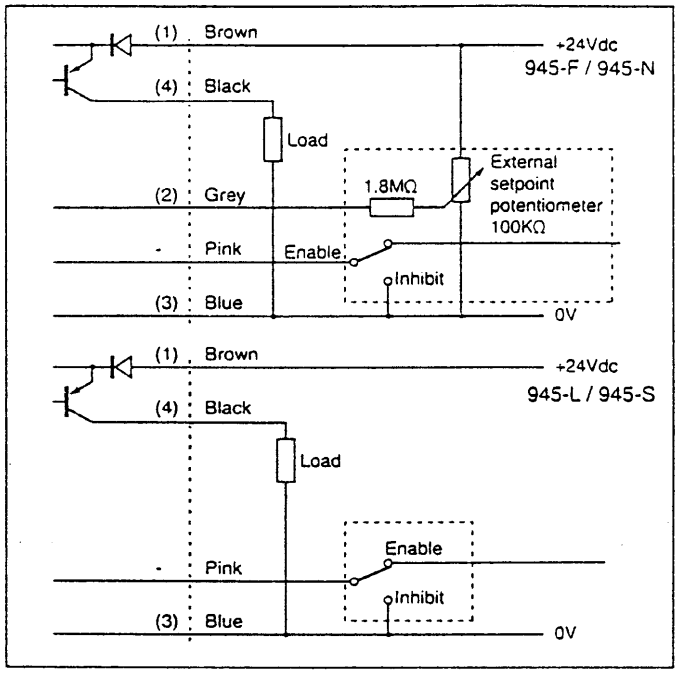



Figure 23. PNP type, output connections

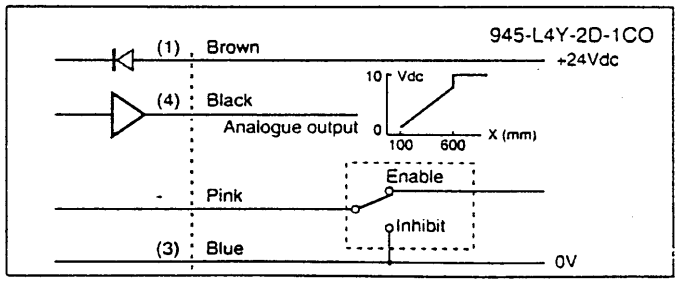



Figure 24. Analogue sensor connections

## Dimensions in mm

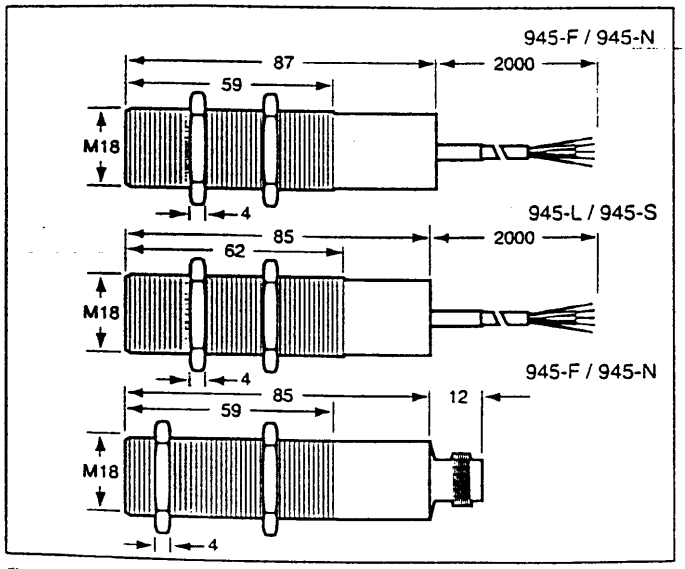



Figure 25. Series 945